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# **PROPULSION DIRECTORATE**

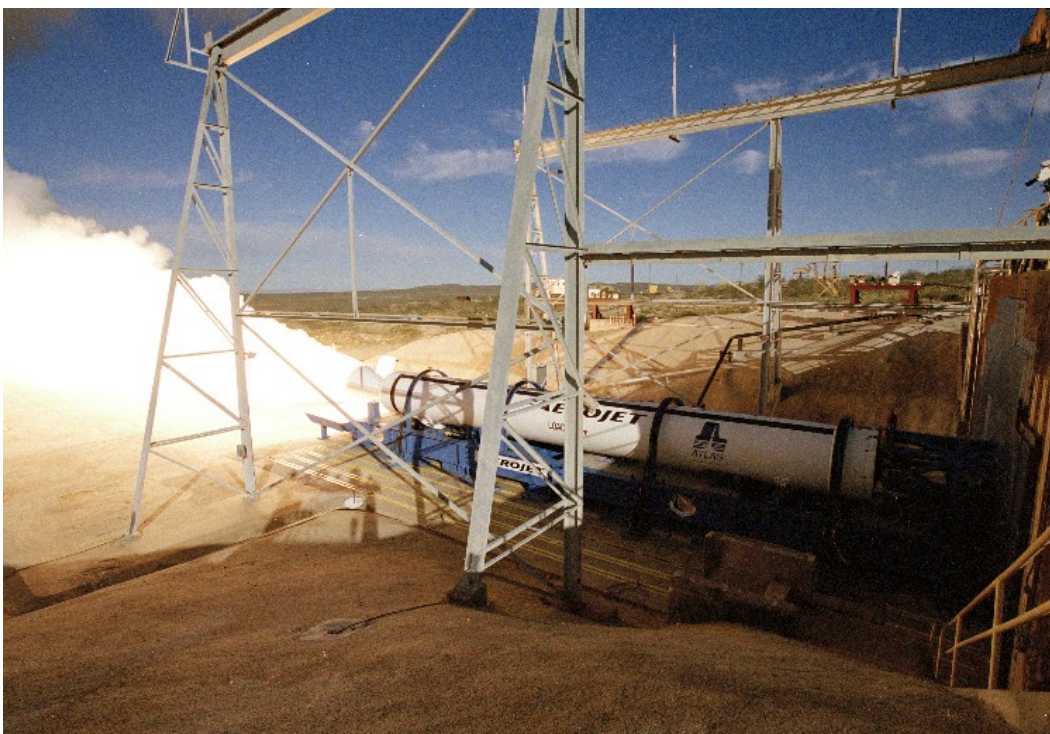
## **Monthly Accomplishment Report May 2005**

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AFRL SUPPORTS ATLAS V ROCKET MOTOR FIRING: An [Aerojet](#) Atlas<sup>®</sup> V solid rocket motor was successfully tested for the second time at AFRL facilities on 24 May 2005. The first test was conducted on 1 April 2005. Aerojet's Block B design motor test, the second of three planned tests, was conducted on a new horizontal rocket test fixture recently constructed by Aerojet on Test Stand 2 at the Propulsion Directorate's Test Area 1-32 at Edwards AFB, California. During an actual launch, the 67-foot long, 62-inch diameter monolithic (or single structure) motor burns for approximately 90 seconds and provides greater than 250,000 pounds of thrust. The previous generation of this solid rocket motor (Block A) has flown on three separate successful Atlas V missions for Lockheed Martin. The Atlas V core vehicle and its combinations of solid rocket boosters is capable of medium to heavy lift and is aimed at commercial as well as US Government missions. It was developed under the US Air Force's [Evolved Expendable Launch Vehicle](#) Program. (Ms. J. Carlile, AFRL/PRSO, (661) 275-5098)



Atlas V rocket motor firing

AFRL BATTERY TECHNOLOGY GOES INTO ORBIT: [Lithion, Inc.](#) of Pawcatuck, Connecticut (a division of Yardney Technical Products) recently put AFRL-supported lithium-ion battery technology into space. The battery was aboard [AFRL's XSS-11 microsatellite](#), which was launched on a Minotaur Expendable Launch Vehicle from Vandenberg Air Force Base, California. The battery in the XSS-11 has the same cell chemistry as the lithium-ion batteries used in the Mars Rovers, Spirit and Opportunity. AFRL's Propulsion Directorate planned and managed the R&D program, with cooperation and funding from NASA/JPL and the Army, that established the cell chemistry and cell design for these batteries. Remarkably, these lithium-ion batteries have been powering Spirit and Opportunity on the surface of Mars for more than a year--the original mission was planned for only 3 months. The 28V/30Ah battery design used for this project has been selected for several other Low Earth Orbit space missions. The

outlook for future satellite and aircraft application of this lithium-ion battery technology continues to be very promising. (Mr. S. Vukson, AFRL/PRPS, (937) 255-5461)

Want more information?

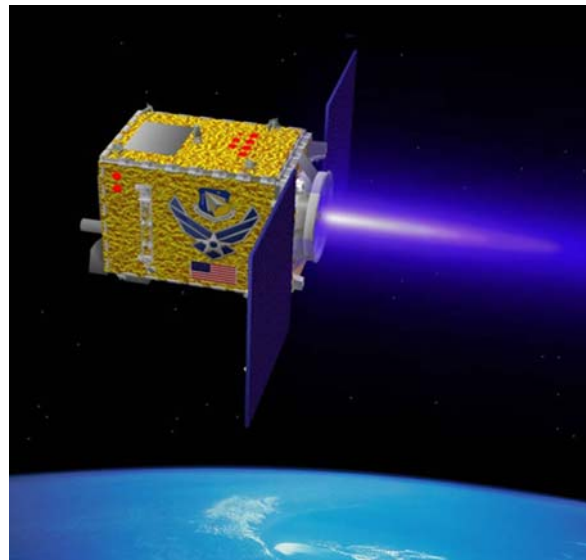
- ❖ An Air Force Link article on the launch is available by clicking [here](#).
- ❖ A Lithion press release is available by clicking [here](#).

ELECTRIC PROPULSION SYSTEM

DELIVERED: AFRL's Propulsion Directorate (AFRL/PR) recently completed successful integrated flight hardware testing of a Hall Effect Thruster subsystem. The flight hardware was subsequently delivered to AFRL's Space Vehicle Directorate (AFRL/VS) at Kirtland AFB, New Mexico, on 20 May 2005. AFRL/VS is now integrating the flight hardware with the TacSat-2 spacecraft for a future launch. The hardware delivered included the Hall thruster system, as well as a suite of interaction sensors designed to measure the first on-orbit interaction data of Hall thrusters with DoD spacecraft. This is the first all-American Hall Effect Thruster ever built for flight, and it represents the first delivery of the lowest power Hall Effect Thruster built to date. The 200 W Hall thruster also serves as the Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Phase II demonstration for spacecraft propulsion, and that milestone was completed prior to delivery with a successful life test at AFRL/PR. The Hall Effect Thruster is an electric propulsion system featuring high specific impulse (approximately 1400 seconds for this design), and nominal thrust levels on the order of 13.5 milliNewtons. The system is very lightweight (approximately 8.5 kg dry mass), and it addresses the need to reduce the overall size and electrical power needs of orbiting spacecraft and satellites. Its primary use is to maintain orbit against drag. (Mr. D. Bromaghim, AFRL/PRSS, (661) 275-5473)



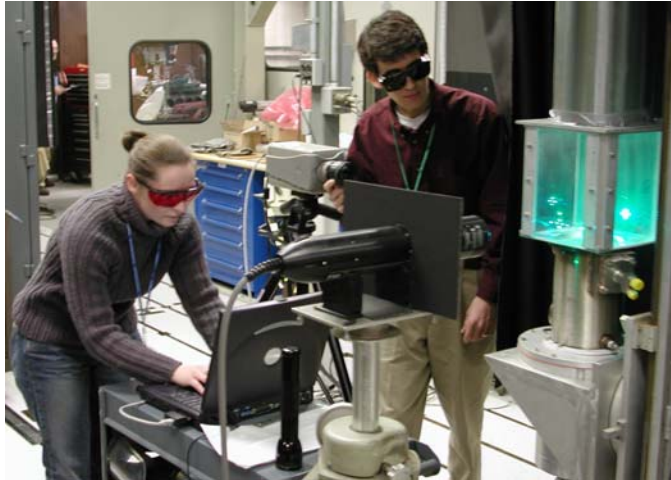
The XSS-11 is launched aboard a Minotaur rocket



The XSS-11 microsatellite



**PROPULSION DIRECTORATE S&Es CAPTURE AIAA/ASME AWARDS:** Several scientists and engineers from AFRL's Propulsion Directorate were honored at the joint AIAA\* Dayton-Cincinnati Section/ASME† Dayton Section Annual Awards Banquet. This banquet was held on 16 May 2005 at the University of Dayton in Dayton, Ohio.



Ms. Amy Lynch (L) was named the ASME Dayton Section Young Engineer of the Year



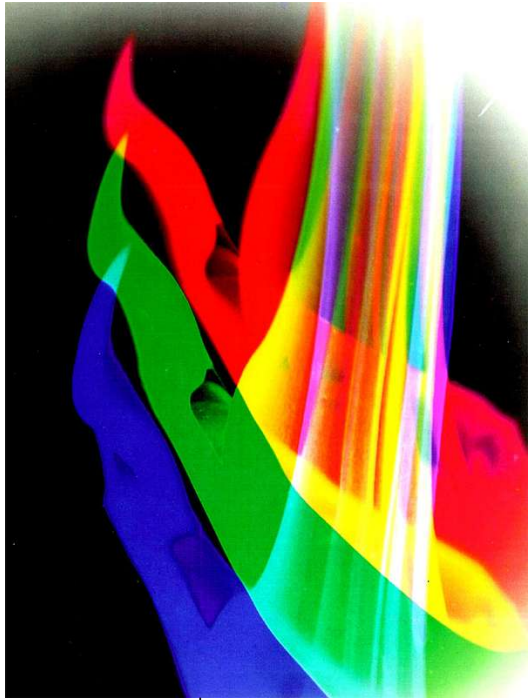
Dr. William Copenhaver received the AIAA Outstanding Section Award for the Dayton-Cincinnati Section

The Propulsion Directorate's Ms. Amy Lynch was recognized as the [ASME Dayton Section Young Engineer of the Year](#). In addition, Dr. William Copenhaver received the AIAA Outstanding Section Award for the Dayton-Cincinnati Section. The Section received Third Place in the Very Large Section Category. AFRL/PR personnel also did well in the 2005 Dayton-Cincinnati Aerospace Sciences Symposium [Art-in-the-Science Competition](#), taking second, fourth, and fifth places. Second place went to Dr. Jordi Estevadeordal‡ for his image titled "Color Falls"; fourth place went to Dr. Russ Spyker for his image titled "Star of the Arcs"; and fifth place went to Drs. Marc Polanka & Jordi Estevadeordal for their image titled "Rings of Saturn." In addition to these awards, the newest [ASME Fellows](#) were recognized at the banquet, including AFRL/PR's Drs. Rengasamy "Pon" Ponnappan, Viswanath Katta, and Sivaram Gogineni.‡ The newest [AIAA Associate Fellows](#) were also recognized, and this group included AFRL/PR's Drs. Mark Gruber, Joe Zelina, Robert Hancock, and Jordi Estevadeordal. (Mr. J. Pearce, AFRL/PRO (UTC), (937) 255-5015)

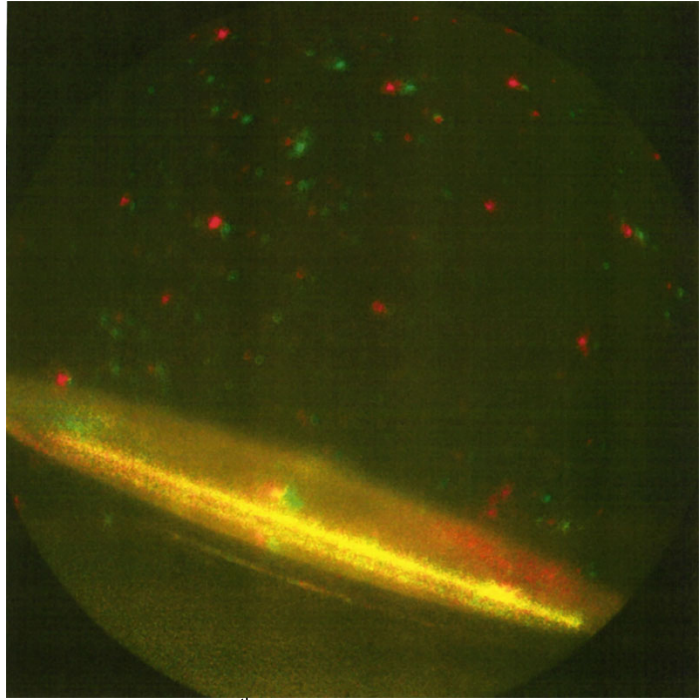
\* AIAA = American Institute of Aeronautics and Astronautics

† ASME = American Society of Mechanical Engineers

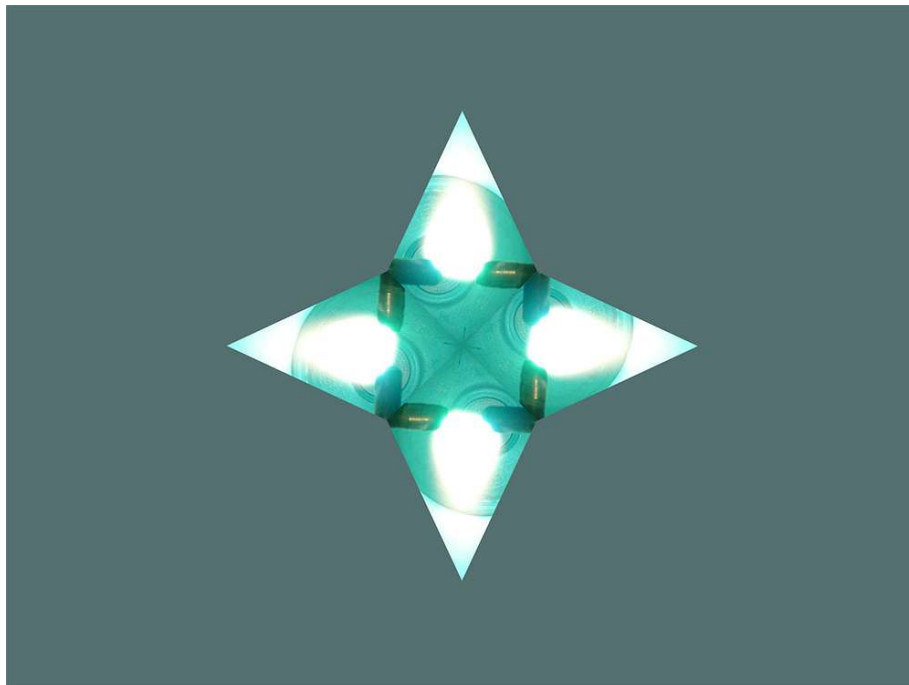
‡ Drs. Estevadeordal, Katta, and Gogineni are AFRL/PR on-site contractors with [Innovative Scientific Solutions, Inc.](#) (ISSI), Beavercreek, Ohio.



"Color Falls" (2<sup>nd</sup> Place)



"Rings of Saturn" (5<sup>th</sup> Place)



"Star of the Arcs" (4<sup>th</sup> Place)

**PR HONORS PAST YEAR'S ACHIEVEMENTS:** On 11 May 2005, the Propulsion Directorate held its 7<sup>th</sup> Annual Awards Celebration to honor the achievements of the past year. This year's ceremony was held at the Hope Hotel and Conference Center at Wright-Patterson AFB, Ohio, with more than 275 people in attendance. The following awards were presented at the ceremony (listed in order of presentation):

<b>Award</b>	<b>Winner(s)</b>
NCO of the Year	TSgt James A. Drake
David A. Hawkins CGO of the Year	Capt Robert H. Lee, Jr.
Technology Transfer Award <sup>§</sup>	Dr. James D. Scofield Mr. Vaughn R. Svendsen & Mr. Jonathan L. Dell
Mission Support of the Year Award <sup>§</sup>	Mr. Forest L. Roberts Ms. Lisa K. Gallagher
Program Manager of the Year Award	Mr. Brett A. Jordan
Scientist and Engineer (S&E) of the Year Award	Mr. Jeffrey M. Brown
Betty Siferd Support Award	Ms. Elizabeth M. Graham
Hart-Sims Program Management Award	Mr. Glenn W. Liston
E. C. Simpson Award	PRP Magnetic Materials Team (Mr. Earl M. Gregory, Mr. John C. Horwath, and Dr. Russell L. Spyker)
Don Ross Award	Mr. Daron R. Bromaghim
S. D. Heron Award	Dr. Paul N. Barnes & Dr. Timothy J. Haugan
Director's Trophy	Mr. John F. Remen

Congratulations to all of the winners and nominees. (Mr. J. Pearce, AFRL/PRO (UTC), (937) 255-5015)



TSgt James A. Drake  
NCO of the Year



Capt Robert H. Lee, Jr.  
David A. Hawkins CGO of the Year

<sup>§</sup> Dual awards were given in this category.





Dr. James Scofield  
Technology Transfer Award



Mr. Vaughn R. Svendsen (L) and Mr. Jonathan L. Dell (R)  
Technology Transfer Award



Mr. Forest L. Roberts  
Mission Support of the Year Award



Ms. Lisa K. Gallagher  
Mission Support of the Year Award



Mr. Brett A. Jordan  
Program Manager of the Year



Mr. Jeffrey M. Brown  
Scientist and Engineer of the Year



Ms. Elizabeth M. Graham  
Betty Siferd Support Award



Mr. Glenn W. Liston  
Hart-Sims Program Management Award





PRP Magnetic Materials Team (L to R: Dr. Russell L. Spyker, Mr. Earl M. Gregory, & Mr. John C. Horwath)  
E. C. Simpson Award



Mr. Daron R. Bromaghim  
Don Ross Award



Drs. Timothy J. Haugan & Paul N. Barnes  
S. D. Heron Award



Mr. John F. Remen  
Director's Trophy

MS. OBRINGER RECOGNIZED FOR REVOLUTIONARY FUELS WORK: AFRL's Ms. Cynthia A. Obringer was recently selected to receive the Exemplary Civilian Service Award. Ms. Obringer was recognized for her distinguished performance as a senior mechanical engineer and program manager in the Propulsion Directorate's Fuels Branch, and as Deputy Division Chief of AFRL/PR's Power Division, from September 1996 to January 2005. Ms. Obringer provided exemplary technical leadership in conducting pioneering fuels research in



Ms. Cynthia A. Obringer

the National Aerospace Fuels Research Complex (NAFRC). She initiated and managed a program to develop affordable low-temperature fuel additives to ensure the usability of JP-8 fuel at temperatures below its freeze point for systems such as the U-2 and Global Hawk. She also played a key role in the National Transportation Safety Board's accident investigation of the TWA-800 disaster by setting up a series of tests to investigate possible causes of the aircraft explosion. Furthermore, during the transition of the Air Force's fighter jets from JP-8 to JP-8+100 fuel, Ms. Obringer was responsible for field evaluations of the +100 fuel additive in A-10, F-15, and F-16 aircraft at three northeast bases. Results of these field evaluations contributed to the Air Force decision to convert all fighter and trainer aircraft to JP-8+100 fuel. (Dr. R. Fingers, AFRL/PRP, (937) 255-6227)

MR. KALLIOMAA EARNS ACCOLADES FOR LEADERSHIP: AFRL's Mr. Wayne M. Kalliomaa was recently selected to receive the Exemplary Civilian Service Award. Mr. Kalliomaa was recognized for his distinguished performance as an Aerospace Engineer in the Propulsion Directorate's Propellants Branch (AFRL/PRSP) from January 2002 to February 2005. During this time, Mr. Kalliomaa provided leadership to the Propellants Branch, as the acting chief, as the financial manager, and as the technical advisor for the branch. As acting chief, he supervised 18 government scientists, engineers, technicians, and administrative staff as well as more than 50 support contractor personnel. During his tenure, he led the branch through exciting accomplishments, such as the discovery of the polynitrogen species,  $N_5^-$ , the synthesis of over 40 new energetic ionic liquids for monopropellant ingredients, and the initiation of two new Integrated High Payoff Rocket Propulsion Technology (IHPRPT) Phase III propellant formulation contracts. As financial manager, his initiatives to reshape the financial management of a critical contract; to enable a reformatting of the division's monthly business reviews; and to promote cooperative agreements with other branches to better transition science to systems have all aided significantly in promoting a more effective technology organization. (Dr. R. Channell, AFRL/PRSP, (661) 275-5762)